

### **Remarks**

By the foregoing amendment section titles have been added to the application.

In addition, the terms “heavy” and “high” have been deleted from claims 14, 16, 17, 18, 19, 31, 32, 33 and 34 and “main” has been substituted therefore. The amendment of the claims is supported by, paragraph [0023] and Figure 1 of the specification. It is respectfully requested that this amendment be entered as it does not constitute new matter. Claims 14-19 and 27-38 are pending in the application.

The disclosure has been objected to on the basis the specification is missing section titles. As noted above, section titles have been added to the application. The specification has also been objected to on the basis it refers to drawings but no drawings were filed with the application. The present application is a Request For Continued Examination application. The originally filed application was published as U.S. Publication No. 2006/0099697 on May 11, 2006 and included Figures 1-4. It is respectfully submitted that the drawings are of record in this application.

Claims 14-19 and 27-38 have been rejected under 35 U.S.C. § 112, second paragraph as indefinite. More specifically, the Office Action states the terms “heavy load” and “high load” in claims 14 and 31 lack antecedent basis. As noted above the terms “heavy” and “high” have been deleted from claims 14 and 31.

Claim 14 and claim 31 (and claims 15-19, 27-30 and 32-38 which depend therefrom) have been rejected as indefinite on the basis that while these claims recite a pre-acidification region, no acidification region is recited. In this regard, it is respectfully submitted that one skilled in the art understands that “pre-acidification” means that acidification takes places prior to fermentation. In this regard, the Examiner’s attention is invited for example, to

the cited Ahn reference which describes a pre-acidification reactor in series with a methanogenic UASB reactor.

Claims 14 and 18 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,395,173 to von Nordenskjöld ("the '173 patent"). Claim 14 specifies means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. As admitted in the Office Action, the '173 patent does not state that the pump in the apparatus disclosed in the '173 patent segregates and selectively transports material to the high load region. The '173 patent does not teach segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region as required by claim 14.

Rather, the '173 patent teaches transporting a random mixture from the acidification region to the heavy load region at col. 3, lines 27-38 as follows:

At least one metering pump **18** having conduits **31** is provided preferably on the outlet side at the base of the mixing and acidifying region **3**, the nozzle-like outlet orifices **42** of the said conduits issuing in the heavy load region **7**. With the aid of this pump or pumps, especially as a function of the size of the heavy load region **7**, varying quantities of mixture, e.g. approximately 40 to 60 litres of waste water per second are disposed in a swirling manner in the base region of the heavy load region **7** and supplied under pressure. The conduits **31** can also be switched for alternative use, in particular when the organic content is high, but first and foremost to save pump energy.

As set forth above, the '173 patent teaches transporting "... varying quantities of mixture . . ." *i.e.*, a random mixture of raw material and acidified substrate. The '173 patent does not implicitly or explicitly teach selectively transporting the preacidified material.

Thus, the '173 patent fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the high load region. Instead, the '173 patent teaches transporting a random mixture of raw material and preacidified material. Accordingly, the '173 patent fails to anticipate claims 14 and 18.

The Office Action further states that the '173 patent discloses using devices to aerate waste water in the mixing and acidifying region at col. 3, lines 24-16 and thus discloses the flotation device of claim 18. In this regard it is respectfully submitted that the '173 patent does not disclose a flotation device, but rather a device which aerates and circulates waste water, *i.e.*, device which circulates air and oxygen through and causes stirring in the mixing and acidifying region rather than flotation. For this additional reason, the '173 patent fails to anticipate claim 18.

Claims 14 and 18 have been rejected under 35 U.S.C. § 103 as obvious over the '173 patent in view of Ahn *et al.* (Water Research, Vol. 35, no. 18, pp. 4267-4276, 2001) ("Ahn"). The Office Action states that Ahn discloses a pre-acidification process which includes the step of using a pre-acidification reactor prior to sending the waste stream to a second reactor wherein the pre-acidified material is drawn from the top of the pre-acidification tank. The Office Action asserts that the materials are implicit within Ahn since material is removed from the top of the pre-acidification tank.

In this regard, it is respectfully submitted that the Examiner has misconstrued the teachings of Ahn.

Ahn describes a study which compares the use of a single UASB (Upflow Anaerobic Sludge Bed) and two-in series UASB systems with respect to high removal efficiency

of biomass granulation and the settleability of granules (see abstract). The two-in-series UASB comprise an upflow reactor for preacidification and a methanogenic reactor.

The use of an upflow-reactor for the preacidification involves a hydraulic retention time, *i.e.* time is needed for transporting the incoming material at the bottom of the reactor to the overflow at the top of the reactor. This type of reactor involves different process steps at different levels of the reactor tank. This type of system requires, for example, that excess sludge be taken out of the tank if the excess impedes, *i.e.*, delays, the decomposition process. At page 4269 left column in 3rd paragraph Ahn states:

“To maintain steady state conditions at this loading rate, excess biomass was wasted from the sludge bed zone or settler zone at about a 3-day interval.”

Further at page 4273 in the right column, 4th para Ahn states:

“Excess sludge was wasted every 3 days for steady state operation [of the reactor].”

Different height levels in an upstream reactor contain substrate at different decomposing states. Decomposition is regulated by means of the hydraulic retention time. If a substrate is not sufficiently processed when it arrives at a certain height of the reactor it must be removed from the reactor – otherwise, it will pass out of the reactor as effluent and will be forwarded to the next step, *i.e.*, the methanogenic reactor. Fig. 1 of Ahn illustrates several outlets at the right hand reactor wall for the removal of substrate at different height levels of the reactor. By removing substrate along the way, the user of such an upstream reactor can receive at the top of the reactor the desired end-product for conveyance to the methanogenic reactor.

In order for solely “acidified substrate” to be present at the top of the reactor, the hydraulic retention time must be such that only pre-acidified substrate is present at the top of the

reactor. In operation of the reactor, new raw material must enter the reactor continuously otherwise the reactor will not deliver any substrate at the top. Since there is no mixing in the upstream reactor tank, non-acidified substrate is transmitted out of the effluent due to being pushed up by new incoming raw material at the bottom of the tank. Ahn does not disclose any mechanism for segregating preacidified material at the top of the reactor, and transmitting the segregated preacidified material, but rather transmits all material which arrives at the top of the tank into the next reactor in series.

Moreover, in contrast to the claimed invention, Ahn teaches that complete acidification is undesirable. Ahn states at right hand column of page 4267:

“There is a consensus at present that the complete acidification adversely impacts granulation”,

Ahn teaches nearly complete acidification within the acidification reactor is undesirable when transporting the material from the acidification into the methanogenic reactor. Further, Ahn states at col. 2 of page 4267:

“A full-scale UASB operation treating brewery wastewater [...] revealed that an excessively long hydraulic retention time (HRT) for the acidification phase was detrimental to the sludge granulation process in the UASB reactor.”

Thus, Ahn teaches away from segregating and distinguishing raw material from acidified material in order to transfer nearly fully acidified material to the methanogenic reactor.

Accordingly, the combination of the ‘173 patent and Ahn fail to render the claimed invention obvious.

Claims 15 and 27 have been rejected under 35 U.S.C. § 103 as obvious over the ‘173 patent or the ‘173 patent and Ahn, in view of US Patent No. 3,920,548 to Fassell *et al.* As discussed above the ‘173 patent alone or in combination with Ahn fails to teach or suggest means

for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Similarly, Fassell *et al.* fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Accordingly, the combination of the '173 patent, Ahn and Fassell *et al.* fail to render claims 15 and 27 obvious.

Claim 28 has been rejected under 35 U.S.C. § 103 as obvious over the '173 patent alone or in combination with Ahn further in view of Fassell *et al.* and Reynell. Reynell discloses a solid digestion vessel and transporting the solid digestion vessel to a second location where a fluid digestion vessel is located. At col. 1, lines 24-31 and col. 7, lines 15-20 Reynell teaches that this arrangement is advantageous as compared to a fixed installation. "A prior art reference must be considered in its entirety, *i.e.*, as a whole, including portions that would lead away from the claimed invention. "MPEP §2141.02. Reynell actually teaches away from the claimed invention in which a preacidification region and main load region are contained in a tank. Accordingly, the combination of Reynell, the '173 patent, Ahn and Fassell *et al.* fail to render claim 28 obvious.

Claim 17 has been rejected under 35 U.S.C. § 103(a) as obvious over the '173 patent alone or in combination further in view of U.S. Patent No. 5,198,113. As discussed above the '173 patent and Ahn fail to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Similarly, U.S. Patent No. 5,198,113 fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Accordingly, the combination of the '173 patent, Ahn and U.S. Patent No. 5,198, 113 fail to render claim 17 obvious.

Claims 31, 34 and 35 have been rejected under 35 U.S.C. § 103 as obvious over the '173 patent in view of Ahn *et al.*, Water Research, Vol. 35, no. 18, pp. 4267-4276, 2001, further in view of U.S. Patent No. 5,198,113. None of the '173 patent, Ahn *et al.*, or U.S. Patent No. 5,198,113 teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Accordingly, the combination of the '173 patent, Ahn and U.S. Patent No. 5,198,113 fail to render claims 31, 34 and 35 obvious.

Claims 16, 19 and 29 have been rejected under 35 U.S.C. § 103 as obvious over the '173 patent alone or in combination with Ahn further in view of Fassell (U.S. Patent No. 3,920,548) and US Publication No. 2003/0213702 to Mann. As discussed above the '173 patent, Ahn and Fassell fail to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the high load region. Similarly, Mann fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the high load region. Accordingly, the combination of the '173 patent, Ahn, Fassell and Mann fail to render claims 16, 19 and 29 obvious.

Claim 30 has been rejected under 35 U.S.C. § 103 as obvious over the '173 patent along or in combination with Ahn in view of US Publication No. 2005/0167359 to Wilkie *et al.* As discussed above the '173 patent and Ahn fail to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Similarly, Wilkie *et al.* fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified

material into the high load region. Accordingly, the combination of the '173 patent, Ahn and Wilkie *et al.* fail to render claim 30 obvious.

Claims 32 and 33 have been rejected under 35 U.S.C. § 103 as obvious over the '173 patent in view of Ahn *et al.*, U.S. Patent No. 5,198,113 and further in view of U.S. Patent No. 4,919,815 to Copa *et al.* As discussed above, none of the '173 patent or Ahn *et al.*, or U.S. Patent No. 5,198,113 teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. The Office Action states that it would have been obvious to one of ordinary skill in the art to employ the steps filtering and settling as suggested by Copa within the teachings of the '173 patent, Ahn and U.S. Patent No. 5,198,113 because the suggestion for doing so at the time would have been in order to minimize the amount of residual solids wasted during the treatment process. Claims 32 and 33 specify a method including retaining the raw materials which have not been preacidified. In this regard it is respectfully submitted that Copa *et al.* teach a process and apparatus in which the residual solids which are recovered are the treating agents, not the raw material to be treated. Accordingly, the combination of the '173 patent, Ahn, U.S. Patent No. 5,198,113 and Copa *et al.* fail to render claims 32 and 33 obvious.

Claims 36 and 37 have been rejected under 35 U.S.C. § 103 as obvious over the '173 patent in view of Ahn *et al.*, and U.S. Patent No. 5,198,113 further in view of Wilkie. Like the '173 patent, Ahn *et al.*, and U.S. Patent No. 5,198,113, Wilkie fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Accordingly, the combination of the '173 patent, Ahn *et al.*, U.S. Patent No. 5,198,113 and Wilkie fail to render claims 36 and 37 obvious.

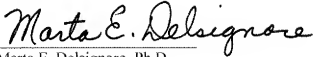


Claim 38 has been rejected under 35 U.S.C. § 103 as obvious over the '173 patent, in view of Ahn *et al.*, Wilkie and U.S. Patent No. 5,198,113. Like the '173 patent, Ahn *et al.*, and U.S. Patent No. 5,198,113, Wilkie fails to teach or suggest means for segregating the raw material from the preacidified material and selectively transporting the preacidified material into the main load region. Further, none of the above references alone or in combination teach or suggest retaining the solids in the preacidification region for a mean duration of 30 to 150 hours. Accordingly, the combination of the '173 patent, Ahn *et al.*, U.S. Patent No. 5,198,113 and Wilkie fail to render Claim 38 obvious.

In view of the foregoing claims 14-19, 27-38, all the pending claims, are in condition for allowance.

Prompt and favorable action is respectfully requested.

Respectfully submitted,

  
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